22 JUN
OF VICTORIA

The Hunter Island Penguin, an Extinct New Genus and Species from a Tasmanian Midden

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Manuscript received 21/12/82 Published 23/5/83

Tasidyptes hunteri n.g. n.sp. is described from a pelvis, a juvenile synsacrum, a tarsometatarsus, and a coracoid from at least two individuals, that were found in an Aboriginal midden on Hunter Island, Tasmania, above and below archaeological material with a carbon date of 760 ‡ 70 years B.P.

The *Tasidyptes* bones resemble those of *Megadyptes*, endemic to New Zealand, and of *Eudyptes*, with its main diversity in New Zealand, more than those of other genera in the Spheniscidae. In the shape of the bones there are similar degrees of difference between *Megadyptes*, *Eudyptes* and *Tasidyptes*. The size of *Tasidyptes hunteri* appears to have been the same as that of the Rockhopper Penguin, *Eudyptes chrysocome*.

Apparently *Tasidyptes hunteri* is the only genus and species of penguin known to have gone extinct during the Holocene.

INTRODUCTION

During the sorting of vertebrate material from prehistoric middens on Hunter Island, Tasmania (O'Connor 1980), bones of an unknown penguin were found in an open midden, known as the Stockyard Site, 40°32'S, 144°45'E (O'Connor 1981, Geering 1981). The site is halfway between the east and the west coasts of Hunter Island, which is six km off the north-western tip of Tasmania (see map A on Fig. 1 which is based on Bowdler 1980).

The midden contained mainly densely packed shells of abalone, *Haliotus ruber*, and warrener, *Subninella undulata*. The midden is divisible into two units. The shells in the upper unit of the midden are broken, possibly as a result of ploughing, and shells in the lower unit are whole. There is only one C^{14} date available, 760 ‡ 70 years B.P., for a sample from the bottom of the upper unit. From a correlation with other middens on Hunter Island, Bowdler (1979) has suggested an age of 400 — 800 years B.P. for the upper unit and of 800 — 1600 for the lower unit. Bowdler (1980:13) found that the last period of Aboriginal use of Hunter Island started about 2500 years B.P.

The material of the new penguin consists of: ANWC BS2670, a complete pelvis in three parts from Spits A1-5 and ZZ1-8 in the lower part of the midden; ANWC BS2667, a partly fused synsacrum of a juvenile from Spit B1-3 in the upper part of the midden; ANWC BS2668, a left tarsometatarsus and ANWC BS2669, a left coracoid, both from Spit XX-2 on the edge of the midden where the stratigraphy is uncertain.

The penguin material from Hunter Island was compared with reference material in the collections of: the Australian Museum, Sydney (AM); the Australian National Wildlife Collection, CSIRO Division of Wildlife and Rangelands Research, Canberra (ANWC); the National Museum of New Zealand, Wellington (NMNZ); the National Museum of Victoria, Melbourne (NMV); and the Queen Victoria Museum, Launceston (QVM). The comparative material included specimens of: Emperor Penguin, *Aptenodytes forsteri;* King Penguin, *A. patagonica;* Adelie Penguin, *Pygoscelis adeliae;* Gentoo Penguin, *P. papua;* Fiordland Penguin, *Eudyptes pachyrhynchus;* Snares Penguin, *E. robustus;* Erect-crested Penguin, *E. sclateri;* Rockhopper Penguin *E. chrysocome;* Macaroni Penguin, *E. chrysolophus;* Royal Penguin, *E. schlegeli;* Yellow-eyed Penguin, *Megadyptes antipodes;* Jackass Penguin, *Spheniscus demersus;* Peruvian Penguin, *S. humboldti;* Magellanic Penguin, *S. magellanicus;* Little Penguin, *Eudyptula minor;* and White-flippered Penguin, *E. (minor) albosignata*. The largest sample of comparative material is of *Eudyptes chrysocome* and has been collected at the nesting colonies on Heard, Macdonald, Macquarie, Campbell and Auckland Islands and on Victorian beaches. It does not differ substantially from the bones of *E. chrysocome* collected at Tristan d'Acunha and illustrated on Plate VII in Watson (1883).

SYSTEMATICS

The pelvis ANWC BS2670 (Figs. 2 and 3, Tables 1 and 2) is recognisable as that of a penguin, Spheniscidae, by a prominent convex cranial facet, by a lack of ventral spines, and by the alae of the ilium being fenestrated. The cranial facet is convex also in shags and cormorants, Phalacrocoracidae, and in darters and anhingas, Anhingidae, but in these families there are ventral spines and the alae of the ilium are not fenestrated.

The juvenile synsacrum ANWC BS2667 (Fig. 2) is too worn and imcomplete for useful comparative measurements. It appears from the spacing and alignment of the intervertebral foramina to be of the same species as ANWC BS2670.

The tarsometatarsus ANWC BS2668 (Fig. 4, Table 3) consists of three only partially fused elements, as is characteristic for modern penguins.

The coracoid ANWC BS2669 (Fig. 5, Table 4) has the trough-like shaft that is characteristic of modern penguins.

Simpson (1975) recognizes 15 fossil genera which occurred during the Miocene or earlier during the Tertiary, and three fossil genera that occurred contemporaneously, probably during the Late Pliocene in New Zealand. Of these one *Marpleornis* is extinct and the other two, *Aptenodytes* and *Pygoscelis* are still extant.

The Hunter Island tarsometatarsus, ANWC BS2668, and the tarsometatarsi of extant genera of penguins differ from those known of fossil genera (at least nine) in being relatively short with two large intermetatarsal foramina, and in having only weakly fused metatarsals. At least four of the early fossil genera have the sternal end of the coracoid curved in the opposite direction to that in modern penguins including *Marpleornis* and the Hunter Island coracoid ANWC BS2669. In one fossil genus, *Palaeospheniscus*, the sternal end of the coracoid appears to be almost straight (Simpson 1972).

The coracoid of *Marpleornis* differs from the Hunter Island coracoid ANWC BS 2669 and from those known of fossil genera, as well as of extant genera, in having an elongated ventral fenestra in addition to a dorsal fenestra or emargination as in other penguins (Marples 1960, Simpson 1972). But we did find such a ventral fenestra (see Fig. 5) in both coracoids of one specimen, ANWC BS1616, of *Eudyptes chrysocome*, from the Auckland Islands, New Zealand, and not in any of the other coracoids of penguins we examined. The length of the only known coracoid of *Marpleornis*, 109mm (Marples 1960, Simpson 1972), is substantially longer than the Hunter Island coracoid ANWC BS2669 and those of *Eudyptes chrysocome* (see Table 4). The coracoid is the only element that *Marpleornis* and the Hunter Island penguin material have in common for comparisons. Simpson (1972) concluded from the shape of the pterygoid that *Marpleornis* is near, but not to be included in, *Pygoscelis*.

A key by Zusi (1975:60-63) indicates that the Hunter Island material belongs to the *Spheniscus-Eudyptula-Eudyptes-Megadyptes* group of genera, because the coracoid ANWC BS2669 has a dorsal fenestra, and because the inner proximal foramen of the tarsometatarsus ANWC BS2668 opens medially to the inner calcaneal ridge. The key also indicates that the pelvis ANWC BS2670 belongs to the *Eudyptes-Megadyptes* group because in a lateral view, the ilioischiatic fenestra is smaller than the acetabular fenestra (see Fig. 2). The key does not provide any post-cranial characters for distinguishing between *Eudyptes* and *Megadyptes*.

We found that the post-acetabular vertebrae of the synsacrum of *Megadyptes* are relatively longer than those of *Eudyptes* and of ANWC BS2670: and that in ANWC BS2670 they are relatively broader than in *Eudyptes*. The long slender lateral processes of the most caudal synsacral vertebrae of ANWC BS2670 are unique when compared with those of other species of penguins we have examined.

The tarsometatarsi of *Eudyptes* and ANWC BS2668 are relatively broad and short, while in *Megadyptes*, *Spheniscus* and *Eudyptula* they are relatively narrow and long. ANWC BS2668 is similar in size, but relatively broader and shorter than the tarsometatarsus of *Eudyptes chrysocome*.

ANWC BS2668 has a prominent and rounded tubercle for the attachment of *M. tibialis anticus* on the middle of the dorsal surface, similar to those of *Eudyptes* and *Megadyptes*, and unlike those of *Spheniscus* and *Eudyptula* in which the tubercle is inconspicuous and elongated. On the ventral surface, the proximal foramina are relatively large in *Megadyptes* and relatively small in *Eudyptes* and ANWC BS2668; the inner and outer proximal foramina are about equally distal in *Eudyptes*, while in *Megadyptes* the inner is more distal than the outer, and in ANWC BS2668 the outer is more distal than the inner.

In *Eudyptes* the trochlea for digit II extends further distally than the trochlea for digit IV. In *Megadyptes* and ANWC BS2668 the trochleae for digits II and IV extend about the same distance distally. The outer two calcaneal ridges of the hypotarsus are parallel in *Megadyptes*, and converge distally to form a "V" in *Eudyptes*. Although worn, they also appear to form a "V" in ANWC BS2668.

We did not find any generic differences in shape between the coracoids of *Spheniscus*, *Eudyptula*, *Eudyptes*, *Megadyptes* and ANWC BS2669. Compared with the similarly sized coracoids of *Eudyptes chrysocome*, the Hunter Island coracoid ANWC BS2669 has a relatively larger scapular facet and at the ventral end a more gradual curvature (see Fig. 5, Table 4).

Because of the similarities and differences in shape of the pelvis and the tarsometatarsus, we consider the Hunter Island material to be of a penguin closely related to *Eudyptes* and *Megadyptes*, but of a different genus. We therefore propose the following new generic and specific names.

Tasidyptes, new genus.

Etymology: A Tasmanian diver, named in honour of the Aboriginal Tasmanians, who initially collected and presumably ate the bird, and in honour of Abel Janszoon Tasman, who discovered and charted some of the shores of their country, that now bears his name.
Diagnosis: A penguin similar to *Eudyptes* and *Megadyptes*, but the caudal part of the synsacrum with relatively broader fused vertebrae with long slender lateral processes; and the ventral surface of the tarsometatarsus with the outer more distal than the inner proximal foramen.

Tasidyptes, hunteri, new species.

Etymology: Named for Hunter Island, the type locality, and in honour of John Hunter, who at the end of the 18th century, besides being a mariner, surveyor and explorer, also found time to draw, paint and make notes on the birds of Australia and its islands in the Tasman Sea. As governor of New South Wales, Hunter sponsored the expedition by Matthew Flinders and George Bass which included the European discovery of Hunter Island.

Holotype:	ANWC BS2670, a pelvis in three parts.
Paratype:	ANWC BS2668, a left tarsometatarsus.
Referred:	ANWC BS2667, a juvenile synsacrum and ANWC BS2669, a left coracoid.

Diagnosis: As for the genus of which it is the only included species, and as in the above descriptions of the holotype and the paratype.

DISCUSSION

Apparently, *Tasidyptes hunteri* is the only genus and species of penguin that is known to have died out since the beginning of the Quaternary, about two million years ago, and it did so less than 760 ± 70 years ago. It may have survived even into historic times which began on Hunter Island less than 200 years ago (Bowdler 1980). We have been unable, however, to find any records that may have referred to it.

The lower part of the Stockyard Midden also contained a cranium of a Cape Barren Goose, *Cereopsis novaehollandiae*, for which there is no historic record in the Hunter Island area. The penguin and the goose may have been eliminated during the occupation of the island either by Aboriginal Tasmanians before, or by sealers at the beginning, or by farmers at the end of the 19th century.

The goose and the penguin may have been vagrants to the island. At present only one species of penguin, the Little Penguin, *Eudyptula minor*, breeds in Australia including Tasmania. Its remains were found in most of the Hunter Island middens, including the upper and lower units of the Stockyard Site, and it still breeds at Hunter Island. Ten other species of penguin have been recorded in Australia as vagrants (Condon 1975, McEvey 1980). Juveniles of one of these, the Rockhopper Penguin, *Eudyptes chrysocome*, were found at Discovery Bay, NMV W6280, and at Port Fairy, NMV B7881, in Victoria.

These two juveniles have synsacra with similar degrees of partial fusion of the vertebrae as ANWC BS2667. Rockhopper Penguins breed on Subantarctic islands, and NMV W6280 and NMV B7881 must have swum at least a thousand sea miles from their natal colony across the Southern Ocean to reach the Victorian Coast.

Thus, *Tasidyptes hunteri* could also have strayed in from elsewhere, where its breeding and demise may have gone unrecorded. It is possible that archeological excavations on the small islands around Hunter Island or at other islands may produce evidence of a prehistoric nesting colony of *Tasidyptes hunteri*, and may yield further material to show what the rest of its skeleton was like.

ACKNOWLEDGEMENTS

We would like to thank Sandra Bowdler, John Calaby, Peter Fullagar, Jeanette Hope, Pat Rich and Pat van Tets for help and advice during various stages of this study. We wish to express our thanks for the help of David Ainley, Graham Avery, Sandy Bartle, Robert Green, Gavin Johnstone, Fred Kinsky, Allan McEvey, Pauline Reilly, Chris Robertson, Ron Scarlett, and Lindsay Scott, and for the logistic support of the Australian Antarctic Division, the Australian Department of Transport, the New Zealand Department of Lands and Survey and the New Zealand Wildlife Service, in bringing together the comparative material without which this study would not have been possible. Sue O'Connor appreciated with Sandra Bowdler, the hospitality of the Maguire family on Hunter Island, and especially the many cups of hot coffee on cold nights. Frank Knight drew the figures.

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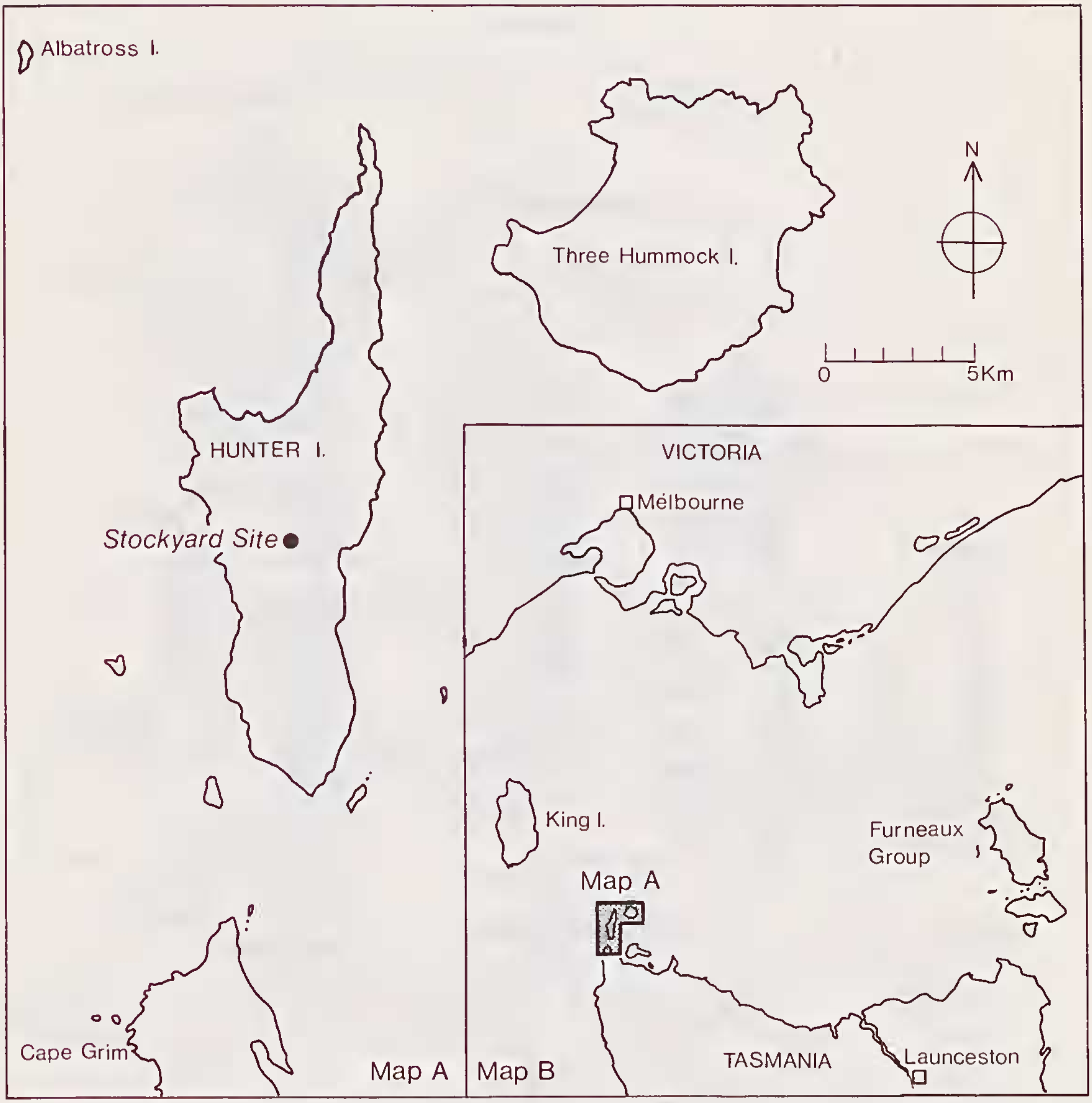

Fig. 1.

Maps showing the location of the Stockyard Site.

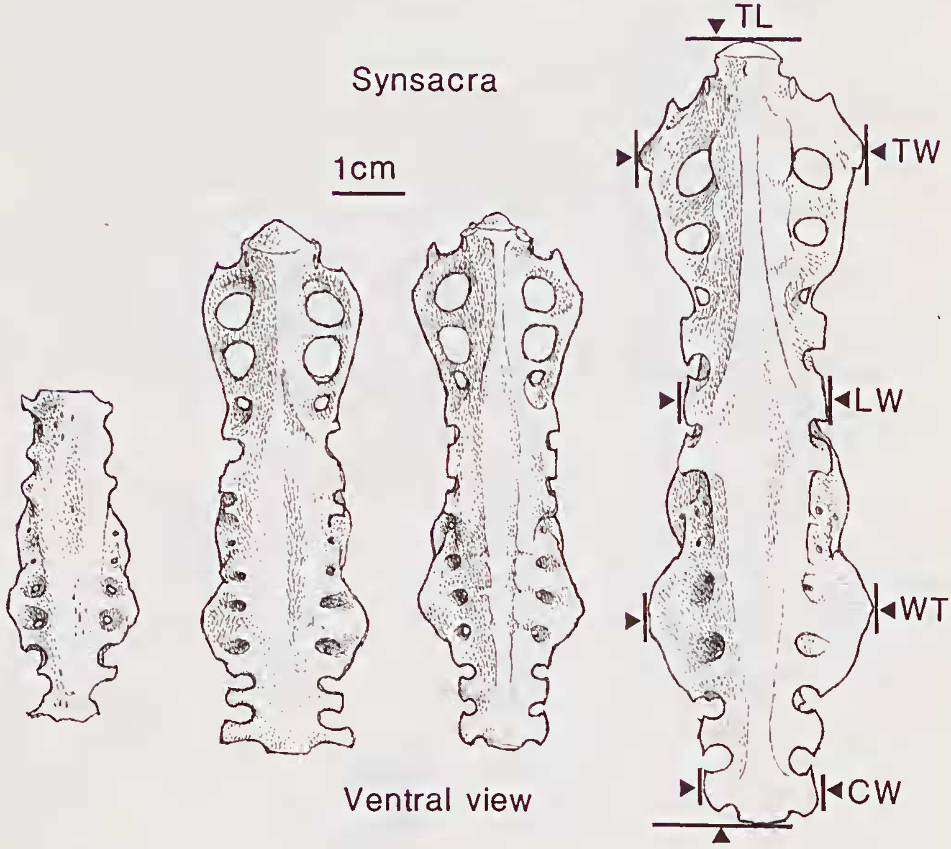

Fig. 2.

Synsacra from left to right of: ANWC BS2667, a juvenile referred to *Tasidyptes hunteri*; ANWC BS2670, the holotype of *Tasidyptes hunteri* n.g. and n.sp.; ANWC BS1616, *Eudyptes chrysocome*; and ANWC BS1612, *Megadyptes antipodes*. For abbreviations indicating measurements see Table 1.

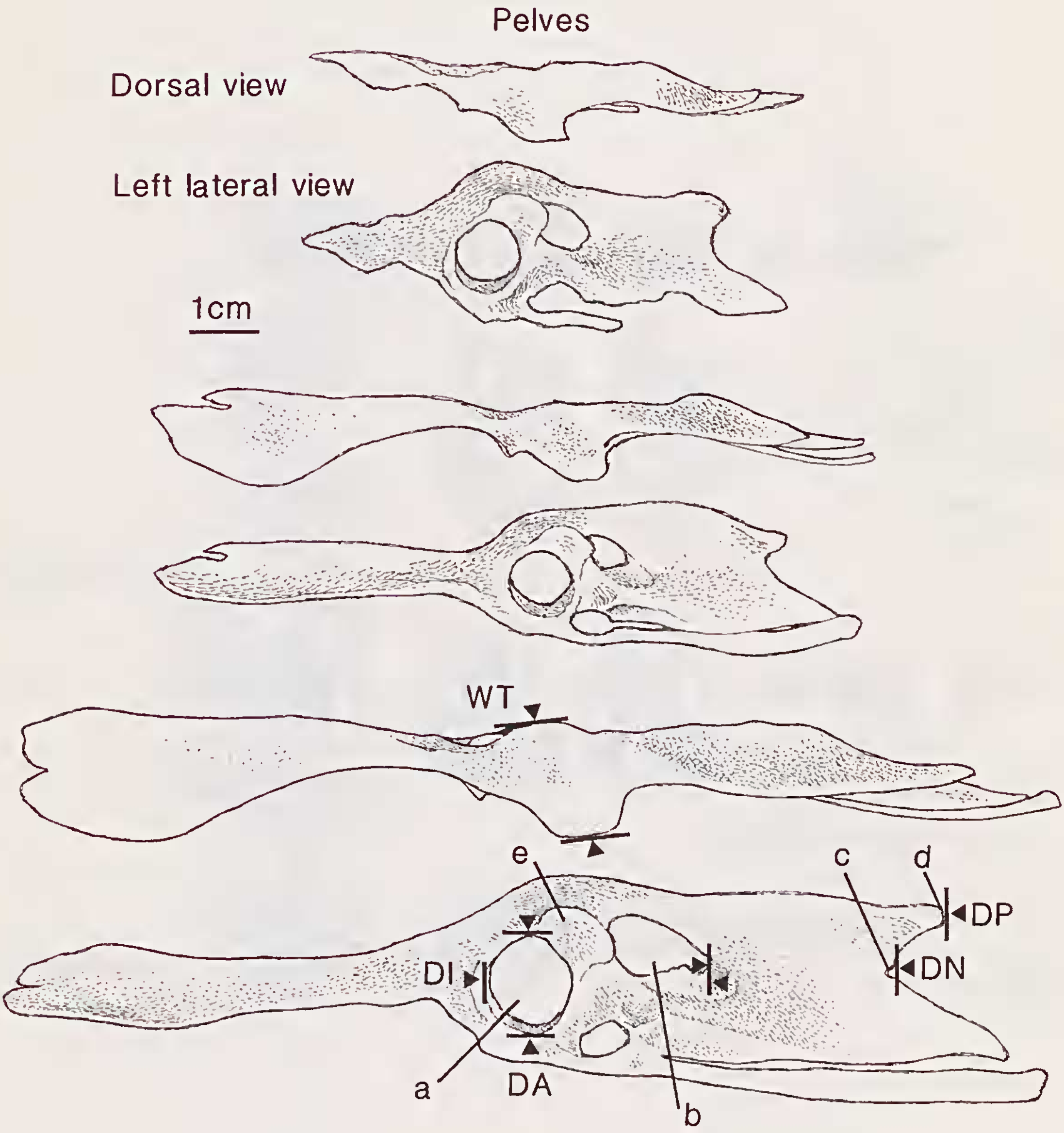

Fig. 3.

Pelves from top to bottom of: ANWC BS2670, the holotype of *Tasidyptes hunteri* n.g. and n.sp.: ANWC BS1616, *Eudyptes chrysocome*; and ANWC BS1612, *Megadyptes antipodes*. For abbreviations indicating measurements see Table 2. The features indicated are: a — acetabular foramen; b - ilio-ischiatic foramen; c — ischial notch; d — terminal process of the ilium; and e — antitrochanter.

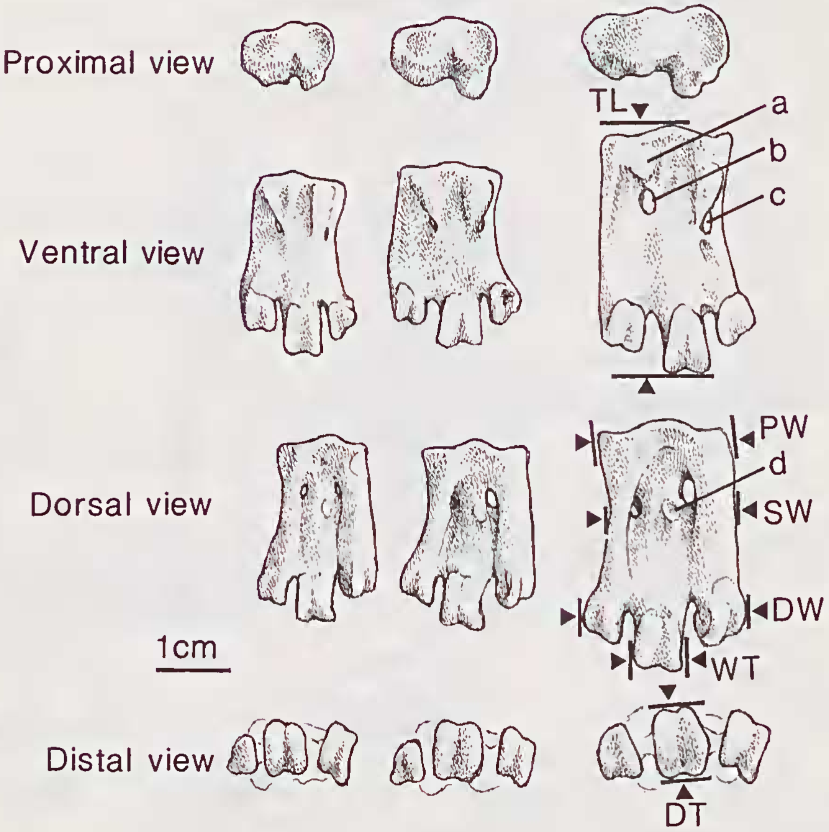

Fig. 4.

Left tarsometatarsi from left to right of: ANWC BS1592, *Eudyptes chrysocome*; ANWC BS2668, the paratype of *Tasidyptes hunteri* n.g. and sp.; and ANWC BS1612, *Megadyptes antipodes*. For abbreviations indicating measurements see Table 3. The features indicated are: a — outer calcaneal ridge; b — outer proximal foramen; c — inner proximal foramen; and d — tubercle for the attachment of *M. tibialis anticus*.

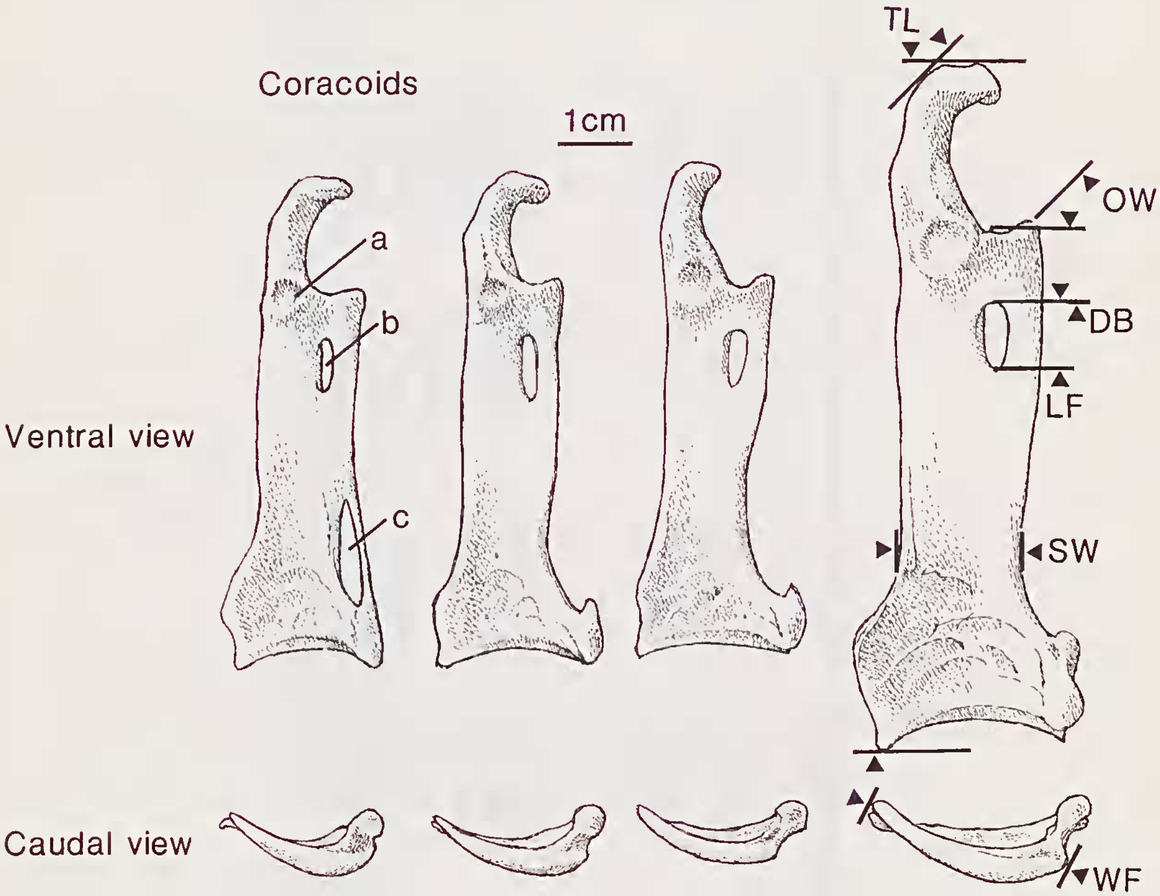

Fig. 5.

Left coracoids from left to right of: ANWC BS1616 and ANWC BS1592, *Eudyptes chrysocome;* ANWC BS2669, referred to *Tasidyptes hunteri;* and ANWC BS1612, *Megadyptes antipodes.* For abbreviations indicating measurements see Table 4. The features indicated are: a — scapular facet; b — dorsal fenestra; and c — ventral fenestra.

Table 1

Measurements in mm of synsacra of *Tasidyptes*, *Eudyptes* and *Megadyptes*. Abbreviations: TL = total length; TW = thoracic width; LW = lumbar width; WT = width near trochanters; and CW = caudal width. See Fig. 2.

	N	TL			TW			LW			WT			CW		
		Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd
T. hunteri	1		73			23			17			24			19	
E. chrysocome	22	70-81	74	4.2	21-28	24	1.5	15-19	17	1.1	21-25	23	1.2	12-15	14	1.0
E. pachyrhynchus	4	76-86	80	4.4	25-29	27	1.4	18-19	18	0.5	25-26	26	0.7	16-17	16	0.5
E. robustus	3	78-86	83	4.2	27-30	28	1.5	16-18	17	0.8	22-25	24	1.4	14-17	15	1.7
E. sclateri	2	91-95	93	3.0	31-32	31	0.1	19-20	20	0.3	27-28	28	0.6	17-18	17	0.5
E. chrysolophus	2	87-90	89	1.8	27-30	28	2.1	19-20	19	0.6	23-24	24	0.6	15-16	15	0.6
E. schlegeli	12	83-105	91	6.2	26-36	30	2.7	19-22	20	1.2	21-28	26	1.7	14-17	16	1.0
M. antipodes	16	91-115	105	6.4	29-32	31	0.9	20-23	21	0.7	25-34	32	2.1	15-17	16	0.6

Table 2

Measurements in mm of pelves of *Tasidyptes*. *Eudyptes* and *Megadyptes*. Abbreviations: DP = distance from front of acetabular foramen to terminal process of ilium: DA = depth of acetabular foramen: WT = greatest width at antitrochanter; DI = distance from front of acetabular foramen to rear of ilio-ischiatic foramen;DN = distance from rear of ilio-ischiatic foramen to ischial notch. See Fig. 3.

	N	DP			DA			WT			DI			DN		
		Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd
T. hunteri	1		42			10			14			18			18	
E. chrysocome	23	40-45	43	1.5	8-11	10	0.7	10-13	12	0.8	18-23	20	1.0	18-20	19	0.8
E. pachyrhynchus	4	45-49	47	2.2	10-11	11	0.3	14-15	14	0.5	20-23	22	1.4	18-20	19	0.6
E. robustus	3	48-59	52	5.6	9-11	10	1.2	13-15	14	0.7	20-23	22	1.7	19-21	20	1.1
E. sclateri	2	64-65	64	0.4	11-13	12	1.0	15-16	15	0.7		25		24-25	24	0.4
E. chrysolophus	2	47-50	48	1.6	10-11	11	1.0	12-14	13	1.6	21-23	22	1.1		21	
E. schlegeli	14	50-53	52	1.0	10-12	11	0.6	12-15	14	0.9	22-24	23	1.0	21-24	23	1.2
M. antipodes	16	54-65	62	2.7	12-14	12	0.6	15-18	17	1.0	23-30	28	1.8	24-27	26	1.0

Table 3

Measurements in mm of tarsometatarsi of *Tasidyptes*, *Eudyptes* and *Megadyptes*. Abbreviations: TL = total length; PW = proximal width; SW = minimum shaft width; DW = distal width; WT = width of trochlea for digit III; and DT = depth of trochlea for digit III. See Fig. 4.

	N	TL			PW			SW			DW			WT			DT		
		Range	$\bar{x}$	*sd*	Range	$\bar{x}$	*sd*	Range	$\bar{x}$	*sd*	Range	$\bar{x}$	*sd*	Range	$\bar{x}$	*sd*	Range	$\bar{x}$	*sd*
T. hunteri	1		27			15			15			18			6			8	
E. chrysocome	26	25-30	27	1.3	13-15	14	0.7	12-14	13	0.7	16-20	18	1.0	5-7	6	0.4	7-8	8	0.4
E. pachyrhynchus	4	29-32	30	1.1	15-17	16	0.8	13-16	14	1.3	18-20	19	1.0	6-7	6	0.4	8-9	9	0.3
E. robustus	1		33			17			15			20			7			10	
E. sclateri	2	32-33	33	0.2	17-18	17	0.4	17-18	17	0.1	22-23	23	0.4	7-8	7	0.6	9-10	10	0.2
E. chrysolophus	6	28-31	29	1.0	15-17	16	0.5	14-16	15	0.5	20-22	21	0.7	6-7	7	0.4	8-9	8	0.5
E. schlegeli	13	27-33	31	1.6	16-18	17	0.7	14-17	16	0.9	20-23	21	0.9	6-8	7	0.3	8-11	9	0.7
M. antipodes	12	34-37	35	1.0	17-19	18	0.7	16-19	17	0.9	21-24	22	0.8	7-8	7	0.4	9-10	9	0.5

Table 4

Measurements in mm of coracoids of *Tasidyptes*, *Eudyptes* and *Megadyptes*. Abbreviations: TL = total length; OW = oblique dorsal width from acrocoracoid to procoracoid; SW = minimum shaft width; WF = width of sternal facet; LF = length of coracoidal fenestra; and DB = minimum distance across bar between top of coracoidal fenestra and notch between scapular facet and procoracoid. See Fig. 5.

	N	TL			OW			SW		
		Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd
T. hunteri	1		68			21			12	
E. chrysocome	30	68-75	70	2.2	18-23	21	1.1	9-15	12	1.2
E. pachyrhynchus	5	75-81	77	2.5	23-24	24	0.3	12-13	12	0.5
E. robustus	3	74-77	76	1.5	22-26	24	1.8	11-14	12	1.5
E. sclateri	2	89-90	90	0.6	27-28	27	0.5		16	
E. chrysolophus	1		83			26			15	
E. schlegeli	16	84-91	87	2.1	25-28	26	0.9	13-18	15	1.3
M. antipodes	16	86-96	90	2.6	23-27	25	1.0	13-17	15	1.0

	WF			LF			DB		
	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd	Range	$\bar{x}$	sd
T. hunteri		22			8			6	
E. chrysocome	17-22	21	1.4	6-10	8	0.9	6-7	6	0.5
E. pachyrhynchus	23-25	24	0.4	9-10	10	0.6	7-8	7	0.5
E. robustus	20-24	23	2.3	7-11	8	2.1	6-7	7	0.2
E. sclateri	27-28	27	0.6	9-10	10	0.7		10	
E. chrysolophus		27			9			8	
E. schlegeli	25-29	27	1.5	7-11	9	1.0	8-11	9	0.7
M. antipodes	24-29	27	1.2	8-11	10	0.7	8-9	9	0.4